PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2004-342465
(43)Date of publication of application : 02.12.2004

(51)Int.Cl. H05B 41/24
H05B 41/231

(21)Application number : 2003-137901
(22)Date of filing : 15.05.2003

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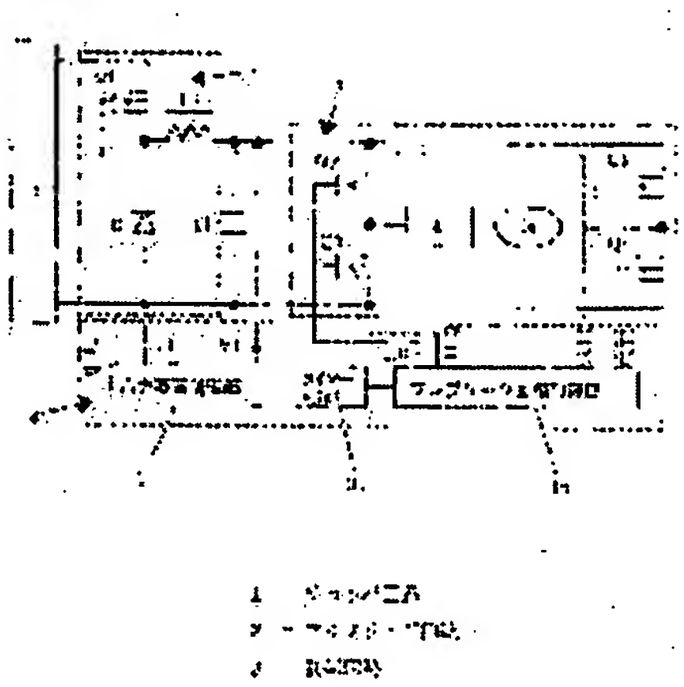
(54) HIGH PRESSURE DISCHARGE LAMP LIGHTING DEVICE AND LIGHT SOURCE

(57)Abstract:
PROBLEM TO BE SOLVED: To suppress flickers of a high pressure discharge lamp and elongate its life.
SOLUTION: A discharge lamp lighting device comprises a chopper circuit 1 composed of a switching element Q1, a diode D1 and an inductor L1, a capacitor C1 to smooth the output of the chopper circuit 1, a full bridge circuit 2 to inverse the output polarity of the capacitor C1 and alternately operate a discharge lamp La, and a control circuit 3 to control the chopper circuit 2 and the full bridge circuit 2. During a period immediately after the start of the discharge lamp La, a polarity inversion operation of the full bridge circuit 2 is performed at an alternating frequency which facilitates the formation of projections of electrodes. After the period, a polarity inversion operation of the full bridge circuit 2 is performed at an alternating frequency which brings about a little change of the electrodes.



LEGAL STATUS

[Date of request for examination] 02.05.2006
[Date of sending the examiner's decision of rejection]
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of rejection]
[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

CLAIMS

[Claim(s)]

[Claim 1]

The chopper circuit which consists of a switching element, diode, and an inductor, The capacitor which carries out smooth [of the output of a chopper circuit], and the full bridge circuit which carries out the polarity reversals of the output of this capacitor, and carries out alternating current actuation of the electric-discharge lamp, In the electric-discharge lamp lighting device which prepared the control circuit which controls a chopper circuit and a full bridge circuit It is the high-pressure electric-discharge lamp lighting device which fixed time amount immediately after starting a electric-discharge lamp makes carry out polarity-reversals actuation of the full bridge circuit on the alternation frequency which is easy to form the projection of an electrode, and is characterized by after said fixed passage of time carrying out polarity-reversals actuation of the full bridge circuit on an alternation frequency with little electrode change.

[Claim 2]

When the tube voltage of a electric-discharge lamp rises after said fixed passage of time in claim 1, it is the high-pressure electric-discharge lamp lighting device characterized by raising an alternation frequency according to it.

[Claim 3]

The high-pressure electric-discharge lamp lighting device characterized by to change the time-amount ratio by the side of the positive electrode of polarity reversals, and a negative electrode in the electric-discharge lamp lighting device which prepared the chopper circuit which consists of a switching element, diode, and an inductor, the capacitor which carries out smooth [of the output of a chopper circuit], the full bridge circuit which carries out the polarity reversals of the output of this capacitor, and carries out alternating current actuation of the electric-discharge lamp, and the control circuit which controls a chopper circuit and a full bridge circuit according to the condition of the time of a electric-discharge lamp, tube voltage, the tube electric current, and tubing power.

[Claim 4]

It is the high-pressure electric-discharge lamp lighting device characterized by after said fixed passage of time changing the time amount ratio by the side of the positive electrode of polarity reversals, and a negative electrode according to the condition of the time of a electric-discharge lamp, tube voltage, the tube electric current, and tubing power by fixed time amount immediately after starting a electric-discharge lamp carrying out polarity-reversals actuation of the full bridge circuit in claim 3 on the alternation frequency which is easy to form the projection of an electrode.

[Claim 5]

Fixed time amount immediately after having had a storage means to memorize the tube voltage before a electric-discharge lamp puts out the light in claims 1 and 2 or either of 4, and starting a electric-discharge lamp is a high-pressure electric-discharge lamp lighting device characterized by carrying out polarity-reversals actuation of the full bridge circuit on the alternation frequency which is easy to form the projection of an electrode according to the tube voltage memorized by said storage means.

[Claim 6]

The high-pressure electric-discharge lamp lighting device characterized for the ripple current of the tube electric current by continuous or enlarging gradually with the rise of tube voltage in the electric-discharge lamp lighting device which prepared the chopper circuit which consists of a switching element, diode, and an inductor, the capacitor which carries out smooth [of the output of a chopper circuit], the electric-discharge lamp to which the electrical potential difference of a capacitor is impressed, and the control circuit which controls a chopper circuit.

[Claim 7]

The high-pressure electric-discharge lamp lighting device characterized by enlarging the ripple current of the tube electric current in case the tubing power of a electric-discharge lamp is changed and it is made small in the electric-discharge lamp lighting device which prepared the chopper circuit which consists of a switching element, diode, and an inductor, the capacitor which carries out smooth [of the output of a chopper circuit], the electric-discharge lamp to which the electrical potential difference of a capacitor is impressed, and the control circuit which controls a chopper circuit.

[Claim 8]

The high-pressure electric-discharge lamp lighting device characterized for the ripple current of the tube electric current by continuous or enlarging gradually with the rise of tube voltage while enlarging the ripple current of the tube electric current, in case the tubing power of a electric-discharge lamp is changed and it is made small in the electric-discharge lamp lighting device which prepared the chopper circuit which consists of a switching element, diode, and an inductor, the capacitor which carries out smooth [of the output of a chopper circuit], the electric-discharge lamp to which the electrical potential difference of a capacitor

is impressed, and the control circuit which controls a chopper circuit.

[Claim 9]

Light equipment using a high-pressure electric-discharge lamp lighting device according to claim 1 to 8.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

This invention is used about a high-pressure electric-discharge lamp lighting device as light equipment of a liquid crystal projector using [for example,] the metal halide lamp.

[0002]

[Description of the Prior Art]

[Patent reference 1]

JP,2003-36992,A

[0003]

The conventional example of a high-pressure electric-discharge lamp lighting device is shown in drawing 8 . The direct current voltage which carried out rectification smooth [of the alternating voltage] is usually supplied to an input terminal I. The pressure of this direct current voltage is lowered by the chopper circuit 1, and it is changed into a direct-current low battery. A chopper circuit 1 is constituted by a switching element Q1, diode D1, and the inductor L1, by the driving signal from the output terminal OUT1 of a control circuit 3, it is turned on and off control of the switching element Q1 is carried out. A capacitor C1 carries out smooth [of the output of a chopper circuit 1]. The full bridge circuit 2 is constituted by switching elements Q2-Q5, and off control is turned on and carried out with the driving signal from the output terminals OUT2-OUT5 of a control circuit 3, and it carries out alternating current actuation of the electric-discharge lamp La. A electric-discharge lamp La consists of a high-pressure electric-discharge lamp like a metal halide lamp. The high-pressure pulse generating circuit 4 generates the high-pressure pulse for starting a electric-discharge lamp La.

[0004]

MOSFET which is a semiconductor device is used for switching elements Q1-Q5. A control circuit 3 is equipped with the output operation control section 31 and the full bridge circuit control section 32, and controls ON of switching elements Q1, Q2-Q5, and OFF. The electrical potential difference V1 according to the tube voltage of a electric-discharge lamp La and the electrical potential difference I1 according to the tube electric current are inputted into a control circuit 3, and it controls so that the output power of delivery and a chopper circuit 1

becomes fixed from an output terminal OUT1 about ON and an off control signal at a switching element Q1. Moreover, ON of switching elements Q2-Q5 and OFF are controlled so that the polarity of the applied voltage to a electric-discharge lamp La carries out alternation by low frequency, and they were made to turn on conventionally with the fixed frequency recommended at a lamp information etc.

[0005]

The general property of the high-pressure electric-discharge lamp La is shown in drawing 9 . Tube voltage changes with times a lot in a constant power operating range of drawing 9 rather than is fixed. For example, if it is the electric-discharge lamp called rated voltage 80V, it has the width of face of 60V to 100V as initial tube voltage, and may change from 50V to 150V while in use. In a constant power operating range, this high-pressure electric-discharge lamp changes a lot like [the tube electric current] tube voltage in order to operate with fixed power. For this reason, if tube voltage rises, since the tube electric current decreases, the electrode temperature of a electric-discharge lamp will light up near the minimum of the optimal temperature for a halogen cycle and a halogen cycle cannot be performed appropriately, it becomes easy to exhaust an electrode tip. When an electrode tip is exhausted, inter-electrode distance becomes long and tube voltage will rise. Then, since it becomes impossible to maintain the suitable temperature for a halogen cycle and consumption of an electrode is further accelerated in order that the tube electric current may decrease, the life of the electric-discharge lamp after tube voltage goes up becomes short.

[0006]

[Problem(s) to be Solved by the Invention]

There is a problem an arc spot stops stabilizing when making the light switch on on the alternation frequency which is easy to exhaust the projection of the electrode shown in drawing 10 when tube voltage changes although it does not have ******** that a flicker will occur if it is the electric-discharge lamp of initial tube voltage by the approach of making it turn on with the fixed frequency recommended at the lamp information mentioned above, and it separates greatly from initial tube voltage, and become easy to generate a flicker. Moreover, it not only exhausts a projection, but in order to exhaust the electrode itself, there is a problem which shortens the life of a electric-discharge lamp accelarative. Moreover, if it is the frequency the projection of an electrode tends to grow up to be, this projection grows too much greatly, tube voltage is reduced, the tube electric current increases, and there is a problem of leading to destruction of the lighting device by the loss, by raising the components temperature of a lighting device.

[0007]

It is to offer the high-pressure electric-discharge lamp lighting device in which the reinforcement of a electric-discharge lamp is possible while the purpose of this invention is not concerned with change of tube voltage, but makes a halogen cycle perform appropriately,

keeps an electrode configuration suitable and controls generating of a flicker.

[0008]

[Means for Solving the Problem]

Although polarity-reversals actuation was conventionally carried out on the fixed alternation frequency which is recommended at a lamp information etc. According to this invention, fixed time amount immediately after starting a electric-discharge lamp is controlled to carry out polarity-reversals actuation on the alternation frequency which is easy to form the projection of an electrode. After that, it is characterized by controlling to carry out polarity-reversals actuation on an alternation frequency with little electrode change (referring to drawing 2), and it is making an arc spot usually form in the height of an electrode at the time of lighting, and a flicker is controlled. Moreover, by making a projection form in an electrode, since a direct electrode is not exhausted, the life of a electric-discharge lamp can be lengthened. Moreover, as shown in drawing 4 , the time amount to which a current flows to the electrode of one side is increased by turns, by controlling to maintain electrode temperature so that a suitable halogen cycle can be performed, consumption of an electrode is controlled and the reinforcement of a electric-discharge lamp becomes possible.

[0009]

[Embodiment of the Invention]

The gestalt of operation of this invention is explained to a detail, referring to the drawing attached below that the description and advantage of this invention should be made clear.

(Gestalt 1 of operation)

The circuit diagram of the gestalt 1 of operation of this invention is shown in drawing 1 . Although it is almost the same as drawing 8 which is the circuit diagram of the conventional example as a configuration of a circuit, it differs from the conventional example in that the timer control section 33 is formed in the interior of a control circuit 3. A control circuit 3 is equipped with the output operation control section 31, the full bridge circuit control section 32, and the timer control section 33, and controls ON of switching elements Q1, Q2-Q5, and OFF. The electrical potential difference V1 according to the tube voltage of a electric-discharge lamp La and the electrical potential difference I1 according to the tube electric current are inputted into a control circuit 3, and it controls so that the output power of delivery and a chopper circuit 1 becomes fixed from an output terminal OUT1 about ON and an off control signal at a switching element Q1. Moreover, it is controlled so that the polarity of the applied voltage to a electric-discharge lamp La carries out alternation of ON of switching elements Q2-Q5, and the OFF by low frequency, and alternation of the fixed time amount immediately after starting a electric-discharge lamp is carried out on the frequency which is easy to form the projection of an electrode, and it is made to operate on an alternation frequency with little electrode change after that by this invention to having made the light switch on conventionally with the fixed frequency recommended at a lamp

information etc. Fixed time amount until it switches an alternation frequency is controlled by the timer control section 33 after powering on.

[0010]

The explanatory view of operation at the time of electric-discharge lamp lighting by this invention is shown in drawing 2 . In a control circuit 3, after supervising tube voltage or the tube electric current and turning on a lighting signal, if it detects that the tube electric current began to flow, the timer control section 33 of a control circuit 3 will begin actuation. In A section when the timer control section 33 has counted fixed time amount, the full bridge circuit 2 operates on the alternation frequency which is easy to form a projection in an electrode. Usually moving to B section of lighting, if the timer control section 33 carries out a timer rise, the full bridge circuit 2 operates on the alternation frequency which cannot exhaust a projection easily. Although the alternation frequency which is easy to form a projection in an electrode, and the alternation frequency which cannot exhaust a projection easily change with lamps On the alternation frequency (for example, 170Hz) from 100Hz which is the frequency of a minimum to 270Hz which is a maximum frequency, the lamp indicated by the patent reference 1 It is supposed that it is easy to form a projection in an electrode, and it is supposed on the frequency (for example, 340Hz) outside a predetermined frequency range (100Hz - 270Hz) that it will be hard to exhaust a projection. Therefore, the alternation frequency in B section should just select the suitable range according to the lamp used, respectively in A section list.

[0011]

Usually, since an arc spot is formed using the height formed in A section, it is hard coming to generate a flicker at the time of lighting. Moreover, since the electrode itself is not exhausted in order to make it operate on the frequency which cannot exhaust a projection easily, the reinforcement of a electric-discharge lamp can usually be achieved in B section of lighting.

[0012]

In addition, the alternation frequency which is easy to form a projection in the electrode of the above-mentioned A section changes also with tube voltage in a constant power operating range of drawing 9 . Since the temperature in tubing differs when it is made to operate on the alternation frequency same before tube voltage changes, behavior of the matter enclosed in tubing changes. Therefore, the configuration in which a projection is formed changes to an electrode. If the projection is not then formed in sufficient magnitude, it will become easy to generate a flicker. Then, the tube voltage under lighting is made to supervise and memorize for every [continuously or] fixed time amount. When making the light switch on next time, the projection of the configuration same each time as an electrode is made to form by making it operate on the alternation frequency doubled with the tube voltage memorized at the end before putting out lights. By doing so, as mentioned above, a flicker can be controlled, and reinforcement of a electric-discharge lamp can be attained.

[0013]

Thus, it controls to change the alternation frequency of fixed time amount in which a projection is made to form to the electrode immediately after memorizing the tube voltage before putting out lights, and starting a electric-discharge lamp with the electrical potential difference. If it controls to make it operate on an alternation frequency with little electrode change after that, since it will change to the frequency which can change the alternation frequency at the time of starting with the tube voltage before putting out lights, and is easy to make a projection form in an electrode, the projection stabilized for every starting can be made to form. Consequently, an arc spot is stabilized and control of an effective flicker is attained.

[0014]

Furthermore, by raising the alternation frequency of B section of drawing 2 to compensate for tube voltage rising, since a projection and an electrode can be maintained at an always suitable configuration, a flicker will not happen and the life of a electric-discharge lamp can be prolonged further. That is, by usually changing the alternation frequency at the time of lighting with tube voltage, an electrode can be formed in a suitable configuration and the reinforcement of a electric-discharge lamp becomes possible.

[0015]

In addition, although the control which raises an alternation frequency during lighting is described by JP,2002-15883,A, it is made to operate on an alternation frequency usually lower than the time of lighting immediately after starting, and it supervises the life of a electric-discharge lamp, operating voltage, output power, the arc length, and at least one measured value of an electrode gap, and if the alternation frequency at the time of lighting is usually raised after reaching some conditions, it has become. In case it usually changes from the alternation frequency immediately after starting to the frequency at the time of lighting by this invention to it, it is controlling to make it operate on the alternation frequency which does not supervise the condition of a electric-discharge lamp and is easy to form a projection by the timer control section in a fixed time amount electrode. If it does in this way, the time of lighting can make an arc spot able to form in the height formed at the time of starting, and can usually control a flicker. Moreover, by making a projection form in an electrode, since a direct electrode is not exhausted, the life of a electric-discharge lamp can be lengthened. Moreover, at the time of lighting, by changing a frequency, a electric-discharge lamp can maintain the always optimal electrode configuration, and control of a flicker and the reinforcement of it usually become possible with tube voltage.

[0016]

(Gestalt 2 of operation)

The circuit diagram of the gestalt 2 of operation of this invention is shown in drawing 3 . Although it is almost the same as drawing 8 which is the circuit diagram of the conventional

example as a configuration of a circuit, it differs from the conventional example in that the full bridge circuit control section 32 of a control circuit 3 supervises the electrical potential difference V1 according to tube voltage.

[0017]

Although the duty ratio by the side of a positive electrode and a negative electrode is made to control by 50:50 in the range of the initial tube voltage of drawing 9 , if tube voltage rises, a duty ratio will be switched to T1:T2 (T1 !=T2) like drawing 4 , and suitable electrode temperature will be maintained. If a duty ratio is changed, the temperature by the side of the pole of the big period T1 of duty will become high rather than it operates a duty ratio by 50:50. If the pole where duty becomes large is carried out by turns, electrode temperature will become high rather than it operates two poles with the duty ratio of 50:50. By doing so, a suitable halogen cycle becomes possible and the reinforcement of a electric-discharge lamp becomes possible. Moreover, control of a flicker will be attained if it is made to make a projection form in an electrode immediately after starting like drawing 2 . The continuous-line section of drawing 4 is the wave of this invention of operation, and the dotted-line section is the wave of the conventional duty ratio 50:50 of operation.

[0018]

Thus, it is controllable by controlling to change the time amount ratio by the side of the positive electrode of an alternation wave, and a negative electrode according to the condition of the time of a electric-discharge lamp, tube voltage, the tube electric current, and tubing power to maintain electrode temperature. When especially tube voltage rises, the time amount to which a current flows to the electrode of one side is increased by turns, and it controls to maintain electrode temperature so that a suitable halogen cycle can be performed. Consequently, consumption of an electrode can be controlled and the reinforcement of a electric-discharge lamp becomes possible.

[0019]

(Gestalt 3 of operation)

The circuit diagram of the gestalt 3 of operation of this invention is shown in drawing 5 . I -- an input terminal and La -- for a capacitor, and Q1, Q6-Qn, as for diode and L1, a switching element and D1 are [a electric-discharge lamp and 4 / a high-pressure pulse generating circuit, and C1, C6-Cn / an inductor and 3] control circuits. MOSFET which is a solid-state-switching component is used for switching elements Q1, Q6-Qn. The direct current voltage which carried out rectification smooth [of the alternating voltage] is usually supplied to an input terminal I. The pressure of this direct current voltage is lowered by the chopper circuit 1, and it is changed into a direct-current low battery. A chopper circuit 1 is constituted by a switching element Q1, diode D1, and the inductor L1, by the driving signal from the output terminal OUT1 of a control circuit 3, it is turned on and off control of the switching element Q1 is carried out. It has the output operation control section 31, and the

electrical potential difference V1 according to the tube voltage of a electric-discharge lamp La and the electrical potential difference I1 according to the tube electric current are inputted into this output operation control section 31, and a control circuit 3 is controlled so that the output power of delivery and a chopper circuit 1 becomes fixed from an output terminal OUT1 about ON and an off control signal at a switching element Q1. Capacitors C1, C6-Cn carry out smooth [of the output of a chopper circuit 1]. The high-pressure pulse generating circuit 4 generates the high-pressure pulse for starting a electric-discharge lamp La.

[0020]

The tube voltage of drawing 9 turns on switching elements Q6-Qn in the range of initial tube voltage with the control signal from the output terminal OUT6 of a control circuit 3 - OUTn from 0V. If tube voltage rises, switching elements Q6-Qn are turned off in order by stages (n-5) with the control signal from the output terminal OUT6 of a control circuit 3 - OUTn. that being right, then the circuit top capacitors C6-Cn will be lost in order by stages (n-5), a ripple current becomes large by stages (n-5) at order, and a current peak becomes large. By enlarging a current peak, from the time when a ripple current is small, electrode temperature can go up, the temperature which can perform the optimal halogen cycle can be maintained, and the reinforcement of a electric-discharge lamp becomes possible.

[0021]

In addition, although there is also the approach of increasing a ripple current by using only one piece and making clock frequency of a chopper circuit low, without connecting many capacitors C1, C6-Cn like drawing 5 , since a flicker of an optical output will occur if it is made to operate on the acoustic resonance frequency of a electric-discharge lamp La, it is not desirable.

[0022]

Then, the 1st control which enlarges a ripple current gradually by carrying out the sequential separation of many capacitors, and going, By combining the 2nd control which enlarges a ripple current continuously by making clock frequency of a chopper circuit low continuously, and going Control which enlarges a ripple current continuously and goes may be realized restricting the variability region of the clock frequency of a chopper circuit to the narrow range, and avoiding actuation on the acoustic resonance frequency of a electric-discharge lamp La.

[0023]

Thus, with the rise of tube voltage, if it controls to enlarge gradually, the tube electric current will decrease because tube voltage goes up, but a ripple current can be enlarged, a current peak can be raised and continuous or the temperature which can perform a suitable halogen cycle can be maintained for the ripple current of the tube electric current so that electrode temperature may not fall in connection with it. Consequently, consumption of an electrode can be prevented and the reinforcement of a electric-discharge lamp becomes

possible. Moreover, the ripple current of the tube electric current is not gradual, and when it controls to become large continuously, there is an advantage to which a flicker of light cannot be easily conspicuous.

[0024]

With the gestalt 3 of operation, although the direct-current high-pressure electric-discharge lamp lighting circuit was described, if the high-pressure pulse generating circuit 4 is connected with a electric-discharge lamp La through the full bridge circuit 2 as shown in drawing 1 or drawing 3 , in the circuitry of drawing 5 , it is applicable also in an alternating current high-pressure electric-discharge lamp lighting circuit.

[0025]

Moreover, also in case tubing power besides at the time of the rise of tube voltage is changed and it is made small, it is good to enlarge the ripple current of the tube electric current. That is, by lowering tubing power, a ripple current is enlarged, a current peak is raised and the temperature which can perform a suitable halogen cycle is maintained so that electrode temperature may not fall. Consequently, consumption of an electrode can be prevented and the reinforcement of a electric-discharge lamp becomes possible.

[0026]

Although the gestalt of the above operation shows the example which uses a pressure-lowering chopper circuit as a chopper circuit, the pressure-up chopper circuit of drawing 6 and the step-down and step-up chopper circuit of drawing 7 can also be used as a chopper circuit. In the pressure-up chopper circuit of drawing 6 , if a switching element Q1 turns on, a current will flow to an inductor L1 with input voltage, and if a switching element Q1 turns off, the electromotive force of an inductor L1 and the sum of input voltage will be charged by the capacitor C1 through diode D1. In the step-down and step-up chopper circuit of drawing 7 , if a switching element Q1 turns on, a current will flow to an inductor L1 with input voltage, and if a switching element Q1 turns off, a capacitor C1 will be charged through diode D1 by the electromotive force of an inductor L1. In addition, in the pressure-lowering chopper circuit of drawing 5 , if a switching element Q1 turns on, the pressure of input voltage will be lowered through an inductor L1, and a capacitor C1 will charge, and if a switching element Q1 turns off, the stored energy of an inductor L1 will be emitted to a capacitor C1 through diode D1. As a chopper circuit of this invention, which chopper circuit of pressure lowering, a pressure up, and step-down and step-up may be used.

[0027]

In addition, in the gestalt of which operation, it does not matter even if it uses others, a bipolar transistor, a relay, etc. of MOSFET as a switching element.

[0028]

[Effect of the Invention]

stabilizing an arc spot by making a projection form in the electrode of a electric-discharge

lamp according to this invention, as explained in full detail above -- a flicker -- control -- or it can lose. Moreover, it can be made to be able to operate on the optimal alternation frequency, and reinforcement of a electric-discharge lamp can be attained by controlling consumption of an electrode or a projection. Moreover, at the time of the rise of tube voltage, and the fall of tubing power, the optimal electrode temperature can be maintained by enlarging a ripple current, and reinforcement of a electric-discharge lamp can be attained by making the optimal halogen cycle perform at it.

[Brief Description of the Drawings]

[Drawing 1] It is the circuit diagram of the gestalt 1 of operation of this invention.

[Drawing 2] It is the explanatory view of the gestalt 1 of operation of this invention of operation.

[Drawing 3] It is the circuit diagram of the gestalt 2 of operation of this invention.

[Drawing 4] It is the explanatory view of the gestalt 2 of operation of this invention of operation.

[Drawing 5] It is the circuit diagram of the gestalt 3 of operation of this invention.

[Drawing 6] It is the circuit diagram of a pressure-up chopper circuit used for this invention.

[Drawing 7] It is the circuit diagram of a step-down and step-up chopper circuit used for this invention.

[Drawing 8] It is the circuit diagram of the conventional example.

[Drawing 9] It is the property Fig. showing the general property of a high-pressure electric-discharge lamp.

[Drawing 10] It is the explanatory view showing the general cross-section structure of a high-pressure electric-discharge lamp.

[Description of Notations]

I Input terminal

1 Chopper Circuit

2 Full Bridge Circuit

3 Control Circuit

4 High-Pressure Pulse Generating Circuit

La High-pressure electric-discharge lamp

Q1-Qn Switching element

D1 Diode

C1-Cn Capacitor

L1 Inductor

DESCRIPTION OF DRAWINGS

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L1 Inductor